

Notice of Allowability

Application No.

10/020,977

Examiner

Gordon J. Stock

Applicant(s)

SHIBATA ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed 6/19/06.
2. ☒ The allowed claim(s) is/are 1,2,4-6,11,12,21,22,25 and 26.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☒ Other PTOL-413B.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 19, 2006 has been entered.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Attorney Melvin Kraus on July 5, 2006. See attached PTOL 413-B.

Claims 1, 2, 5, 11, 21, 22, and 25 are amended as follows:

1. (Currently Amended) A method for detecting a defect, comprising the steps of:
repeatedly obtaining image signals of a same portion of a sample by imaging said sample through an optical system by changing optical conditions;
analyzing said repeatedly obtained image signals and selecting plural optical conditions which decrease a difference of contrast in the image signal among segments corresponding to a plurality of regions on said sample;

obtaining image signals of said sample under said selected plural optical conditions by imaging said sample with said optical system;

evaluating images obtained under said selected plural optical conditions to adjust optical conditions for inspection; and

detecting a defect of said sample by processing image signals of the sample under said adjusted optical conditions;

wherein in the step of evaluating, said images are evaluated so as to determine an inspection threshold, which is greater than a maximum contrast difference among false defects detected at the step of obtaining image signals and with which a maximum number of [[the]] true defects can be detected.

2. (Currently Amended) A method for detecting a defect according to claim 1, wherein the changing of optical conditions includes selecting different transmission ratios of 0-th order diffracted light included in entire light generated by [[said]] illumination and reflected from said sample.

5. (Currently Amended) A method for detecting a defect, comprising the steps of:
illuminating a sample through an optical system;
repeatedly obtaining a plurality of image signals of a same portion of said sample through said optical system by changing optical conditions included in entire light generated by said illumination and reflected from said sample and imaging said sample;

selecting plural optical conditions for which defect detection sensitivity is increased by analyzing said repeatedly obtained plurality of image signals having the changed optical conditions;

evaluating images obtained under the selected plural optical conditions and setting the optical conditions for inspection in accordance with the evaluation of the images which includes determining an inspection threshold, which is greater than a maximum ~~control~~ contrast difference among false defects detection at the step of repeatedly obtaining image signals and with which a maximum number of true defects can be detected;

obtaining the image signals by imaging said sample with said optical system while scanning said sample in a viewing field of said optical system under said set optical conditions; and

detecting a defect of said sample by using the image captured under said set optical conditions.

11. (Currently Amended) An apparatus for detecting a defect, comprising:
 - a stage for loading a sample;
 - an illuminating system which illuminates the sample loaded on said stage through an objective lens;
 - an image detecting unit which forms an optical image of said sample illuminated by said illuminating ~~[[unit]]~~ system and detects said optical image with a sensor to output the image signals of said sample;

an image processing unit which processes said image signal output from said image detecting unit to detect defects of said sample; and

a control unit which controls said image detecting unit to repeatedly detect the optical image of said sample by changing optical conditions, and controls said image processing unit to analyze said repeatedly detected image signals and to select plural optical conditions which decrease a difference of contrast in the image signal among segments corresponding to a plurality of regions on said sample, to evaluate images obtained under the selected plural optical conditions and to determine the optical conditions including an inspection threshold, which is greater than a maximum contrast difference among false defects detected and with which ~~[[the]]~~ a maximum number of ~~[[the]]~~ true defects can be detected, which are utilized for inspection so as to decrease a ~~different~~ difference in contrast in an image signal among segments corresponding to a plurality of regions on said sample.

21. (Currently Amended) A method for detecting a defect, comprising the steps of:
- repeatedly obtaining image signals of a same area of a sample by imaging said sample by changing optical conditions;
 - analyzing said repeatedly obtained image signals and selecting plural optical conditions which modify a contrast in the image signal;
 - obtaining image signals of said sample under said selected plural optical conditions by imaging said sample with ~~[[said]]~~ an inspection system;
 - evaluating images under said selected plural optical conditions to adjust optical conditions for inspection including an inspection threshold, which is greater than a maximum

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contrast difference among false defects detected at the step of obtaining and with which ~~[[the]]~~ a maximum number of ~~[[the]]~~ true defects can be detected; and

detecting a defect of said sample by processing the image signals of the sample obtained through said inspection system under said adjusted optical conditions.

22. (Currently Amended) A method according to claim 21, wherein said optical conditions include ~~[[is]]~~ a polarization state of a light which illuminates said sample in the step of obtaining.

25. (Currently Amended) An apparatus for detecting a defect, comprising:
an imaging unit which repeatedly obtains image signals of a same area of a sample by imaging said sample by changing optical conditions;

an analyzing unit which analyzes said repeatedly obtained image signals and selects plural optical conditions which modify a contrast in the image signal;

said imaging unit obtaining image signals of said sample under said plural optical conditions;

an evaluating unit which evaluates images obtained under the selected plural optical conditions and which adjusts optical conditions for inspections based on the evaluation of the image which includes determining an inspection threshold, which is greater than a maximum ~~control~~ contrast difference among false defects detected and with which a maximum number of true defects can be detected; and

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a detecting unit which detects a defect of said sample by processing the image signals of the sample obtained through an inspection system under said adjusted optical conditions.

Allowable Subject Matter

3. **Claims 1, 2, 4-6, 11, 12, 21, 22, 25, and 26** are allowed.

4. The following is an examiner's statement of reasons for allowance:

As to **claim 1**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for detecting a defect the particular step of evaluating with a determination of an inspection threshold, in combination with the rest of the limitations of **claims 1, 2, 4**.

As to **claim 5**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for detecting a defect the particular step of evaluating images with a determination of an inspection threshold, in combination with the rest of the limitations of **claims 5 and 6**.

As to **claim 11**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an apparatus for detecting a defect the particular control unit with a determination of an inspection threshold, in combination with the rest of the limitations of **claims 11-12**.

As to **claim 21**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for detecting a defect the particular step of evaluating images with a determination of an inspection threshold, in combination with the rest of the limitations of **claims 21-22**.

As to **claim 25**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an apparatus for detecting a defect the particular evaluating unit with a determination of an inspection threshold, in combination with the rest of the limitations of **claims 25-26**.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: U.S. Patent 6,947,587 to Maeda et al.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (571) 273-8300

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

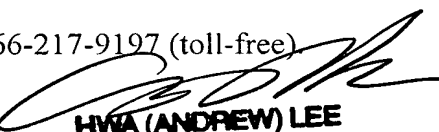
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)


gs

July 5, 2006





HWA (ANDREW) LEE
PRIMARY EXAMINER

Gregory J. Toatley, Jr.
Supervisory Patent Examiner
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